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ABSTRACT

To explore how instruction in questioning can enhance teachers' use of questions that promote comprehension and how teachers' instruction of students in such strategies can enhance their ability to comprehend content area texts independently, this paper looks at prereading, during-reading, and postreading questioning activities. The first major section of the paper discusses two kinds of conceptual knowledge involved in the comprehension of expository prose: text structure knowledge and knowledge of text processing strategies. The second section of the paper looks at the kinds of questioning strategies that have been effective in developing students' comprehension of expository text. Specifically, it uses a reading lesson as a framework for discussing questions used in the prereading, during-reading, and postreading stages of the lesson. The third section of the paper examines the instructional methods that contribute to students' independent use of questioning strategies: (1) direct explanation and modeling, (2) guided practice, and (3) question answer relationships. The paper concludes by noting that the quantity of research focusing on questioning underscores the pervasiveness of questioning strategies in the classroom. (A six-page list of references is provided.) (FL)

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Occasional Paper No. 109

USING QUESTIONING STRATEGIES TO PROMOTE STUDENTS' ACTIVE COMPREHENSION OF CONTENT AREA MATERIAL

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Abstract

This paper describes the importance of prereading, during-reading, and postreading questioning activities for improving students' independent reading and comprehension of content area textbooks. Three questions are addressed in the paper: (a) What is involved in students' comprehension of expository text? (b) What questioning strategies have been effective in developing students' comprehension of expository text? and (c) What instructional methods contribute to students' independent use of questioning strategies?

In discussing general issues in students' comprehension of expository text, the authors describe the importance of helping students develop conceptual knowledge, text structure knowledge, and text-processing strategies. In the second section, which deals with questioning strategies, specific strategies for different phases of a content area lesson are described and examples of how to implement such practices are included. In the third section, instructional practices such as direct explanation, modeling, and guided practice that promote comprehension of content area texts are discussed. A sample lesson with teacher-student dialogue is included.

USING QUESTIONING STRATEGIES TO PROMOTE STUDENTS' ACTIVE COMPREHENSION OF CONTENT AREA MATERIAL[1]

Helene M. Anthony and Taffy E. Raphael[2]

Why Is Content Area Reading a Concern?

I don't know why I didn't do better on the test. I answered all the questions at the end of the chapter.

I don't know what questions I have, I just don't get it.

How long does my answer have to be?

These comments and questions are illustrative of those teachers hear frequently from students in their content area classrooms and are illustrative of what can lead to a very frustrating situation for content area teachers. Before students are ever placed in situations where they must learn from content area texts, they have been through several years of instruction in basic reading skills and in strategies for comprehending a variety of texts. However, reports of the National Assessment of Educational Progress (NAEP, 1981) indicated that intermediate and secondary students have difficulty understanding, inferring from, and remembering information from content area materials. Paris (1986) cites several reasons that may contribute to this problem, among the most important being students' lack of knowledge about how to be strategic readers.

What does it mean to be a strategic reader? Doing the following mini-activity may help provide some insight. Read the next four pages

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[1]To appear as a chapter in J. Flood and D. Lapp (Eds.), Instructional Theory and Practice for Content Area Reading and Learning. Englewood Cliffs, NJ: Prentice-Hall.

[2]Helene Anthony is a research assistant with the Cognitive Strategy in Writing Project. Taffy Raphael, coordinator of the project, is an associate professor of teacher education at Michigan State University. The authors wish to acknowledge and thank Carol Sue Englert and Linda M. Anderson for their comments on an earlier version of this paper. They would also like to thank Cherie Tiedt and Eunice VanEllis for their assistance with manuscript preparation.

of this paper as if you are preparing for an essay test about the importance of questioning strategies in comprehending text. Take notes as you go, not about the content of material, but about what you are doing to remember the information. Did you outline? take notes? write short summaries? ask questions? Next, reread this section as if you were taking a multiple choice examination over the same information. Did you read it in the same way? read it differently? look for important words to define? watch for key names or dates? reread sections? Finally, go back and read one more time as if you were reading for pleasure. Notice how your strategies for reading vary from the previous two activities.

Most skilled readers can use a variety of strategies for understanding and remembering the texts they read and apply these strategies differently depending upon their comprehension goals. How does comprehension work? What are effective comprehension strategies? What can we do to teach young readers to be strategic comprehenders? Why are these important questions? This paper will focus on why we are concerned about children's content area reading and what can be done to enhance their ability in this area.

As students move from the elementary grades to the middle and secondary schools, many of them experience increasing difficulty with their school reading (Alverman & Boothby, 1982; NAEP, 1981). Students who were previously considered average readers may find content area texts more challenging, whereas students who were considered below average in reading ability may not be reading their textbooks at all (Rieck, 1977). Students' difficulty with content area material may be attributed to the type and level of the text, to readers' insufficient background knowledge, or perhaps to students' general lack of ability.

The current view among scholars in the reading community suggests that the reasons for problems in content area reading are quite complex, due to

the active nature of reading comprehension (Anderson & Pearson, 1984; Ruddell & Speaker, 1985; Rumelhart, 1981; Smith, 1978). Skilled readers are actively involved in constructing meaning by integrating information from the text with relevant information from their background knowledge and experiences. Further, this interaction between reader and text can occur in a variety of instructional settings and with a range of goals or purposes for the reading. Thus, to understand the cognitive processes that enhance comprehension, ensure students' ability to comprehend, and teach students strategies for remediating comprehension failure, it is important to understand how different reading tasks, goals, and instructional environments influence comprehension ability (Wixson & Lipson, 1986).

The impact of changes in the task, goals, and instructional environment can be seen when students move from basal readers to content area material. First, the primary purpose of the reading task moves from one of learning to read to one that focuses on reading to obtain information from or to analyze written material. Second, both the content and organization of the text are likely to be novel. Whereas basal readers present relatively familiar topics in a familiar story form, content area textbooks introduce new information in a new way. Students need to learn how to read text for a variety of different purposes and texts containing less familiar content and organization.

Third, in addition to changes in purposes and materials, there is a change in the instructional climate itself. Students are no longer taught how to read. Instead, the assumption is made that the child has learned the fundamental skills of reading and thus can gain, independently, information from text. Instructional support that focuses on the process of reading becomes secondary to the focus on acquiring the content of the text. Yet, with such changes in goals, tasks, and the difficulty students have in content area reading, clearly some instructional support focusing on

teaching effective strategies for gaining information from text is necessary.

What might such instruction look like? Several strategies have been suggested to content area teachers in the past. These strategies have usually fallen within the realm of teaching students study skills (for a review of research in this area see Anderson & Ambruster, 1984). The assumption underlying the teaching of such strategies as outlining, summarizing, or questioning is that they induce the reader into active processing. For example, as readers read, then generate questions, they must reorganize the text or reprocess it in some way. These strategies can be expected to lead to enhanced understanding of and memory for the content read (Rothkopf, 1982). Yet, the research on the effectiveness of traditional study skills is equivocal--often the result is failure to change students' performance when reading independently. One reason why some of the studies may not have reflected positive relationships between, for example, self-questioning and comprehension may be attributable to how students were taught or prompted to use the strategy.

This paper examines one long-standing study tool--questioning--used by teachers and students to promote and assess their comprehension. Its purpose is to focus on (a) how instruction in the use of questioning can enhance teachers' asking of questions that promote students' comprehension, and (b) how teachers' instruction of students in such strategy use can enhance students' ability to comprehend content area texts independently. For the reader's convenience, we have organized the implications of research related to questioning in terms of three questions important to content area teachers: (a) What is involved in students' comprehension of expository text? (b) What questioning strategies have been effective in developing students' comprehension of expository text? and (c) What can teachers do to

provide more effective instruction to enhance students' independent use of questioning strategies?

What Is Involved in Comprehension of Expository Text?

When students comprehend the text they are reading, they are making links from their background knowledge (i.e., what they already know) to the new information in the text (Pearson & Johnson, 1978). This acquisition of new knowledge is, in fact, comprehension. Success in comprehending text involves highly complex cognitive processing. Fundamental to these cognitive processes is knowledge: knowledge about the concepts discussed in the text, knowledge about how information is organized and presented in text, and knowledge about and control of the strategies for acquiring the information from text; that is, comprehension involves conceptual knowledge, text structure knowledge, and knowledge about reading strategies (Garner, 1985; Paris, Lipson, & Wixson, 1983). The term metacognition has been used by many researchers (e.g., Brown, Campione, & Day, 1981; Garner, 1985; Paris et al., 1983) to describe one's knowledge about cognitive processes such as reading. Two of the types of knowledge we discuss--text structure knowledge and knowledge about strategies--can be thought of as metacognitive knowledge. Metacognitive knowledge, together with conceptual knowledge, provides the foundation for successful comprehension.

Conceptual Knowledge

Conceptual knowledge is the background knowledge that students possess for specific topics. Students must have enough familiarity with the particular subject matter being read to be able to link new information in the text to what they already know (Glaser, 1984). Studies have shown that students will understand and remember more of what they have read when they have well-developed conceptual knowledge, or schema, for that topic. For

example, Pearson, Hansen, and Gordon (1979) measured students' background knowledge relevant to reading a passage about spiders and found, not surprisingly, that students with high conceptual knowledge comprehended the passage better than students with low conceptual knowledge, particularly when information was not explicitly stated in the text. Chi (1978) found similar correlations between conceptual knowledge and comprehension. In fact, Langer and Nicholich (1981) found that prior knowledge was a better predictor of comprehension than IQ or general reading level.

This positive relationship between background knowledge and comprehension has been confirmed in different instructional studies. Hansen and Pearson (1983) taught good and poor fourth-grade readers using a prereading technique designed to help students access relevant knowledge or increase students' knowledge about the topic of the material to be read. Graves and Prenn (1984) built students' knowledge base by "previewing" the material to be read. In both studies, these prereading activities led to enhanced student comprehension.

Text Structure Knowledge

In addition to conceptual knowledge, students must have knowledge of how information is organized and presented through different expository text structures (e.g., explanation, comparison/contrast, and problem/solution). Understanding text structures provides a way of identifying which information is most important and which presents supporting details (van Dijk & Kintsch, 1983). Studies of students' text structure knowledge have demonstrated that students who make use of the text organization comprehend better and recall more information than students who do not (Meyer, Brandt, & Bluth, 1980; Taylor, 1982). Further, instructional research in which students were taught about text structures has shown that such instruction leads to enhanced comprehension. Raphael and Kirschner (1985) taught middle

school students how comparison/contrast texts are organized, the questions the texts are intended to answer, and the key words and phrases that signal readers about where to find different information. When these students read comparison/contrast passages and later recalled the information, the quality and quantity of their recalls improved. Further, when students were given two different texts on related topics (e.g., Sparta and Athens) and asked to write summaries using information from both texts, the quality of their summaries improved.

Text-Processing Strategies

Finally, students need knowledge about text-processing strategies that aid comprehension of expository text. According to Baker and Brown (1984) effective readers plan, monitor, and evaluate their reading activities. Garner and her colleagues (Garner, 1980; Garner & Kraus, 1981-82; Garner & Reis, 1981; Garner, Wagoner, & Smith, 1983) found that middle school students identified as good comprehenders were more likely to be aware of purposes for reading, detect failures in their understanding of texts, and take appropriate action to correct comprehension failures than were poor comprehenders. Two text-processing strategies that helped readers with these tasks and that appeared to be deficient among poor comprehenders were ongoing summarization and strategic backtracking (Scardamalia & Bereiter, 1984). In one study poor comprehenders were taught a "lookback" procedure for answering text-based questions (Garner, Hare, Alexander, Haynes, & Winograd, 1984); that is, they were taught purposes and strategies for going back through previously read text to locate important information. The study showed that these students used the strategy more frequently and had a better understanding of the material than did comparable students who had not received instruction.

To review, students' conceptual knowledge of a particular text's content and its structure and their metacognitive knowledge and control of text-processing strategies affect the degree of comprehension that results from reading. Readers who are actively engaged in the process of constructing meaning show both an awareness and use of these types of knowledge. Unfortunately, many middle school and high school students who have trouble comprehending content area texts tend to be passive readers (Ryan, Ledger, Short, & Weed, 1982). They may have sufficient decoding skills but they apparently lack some or all types of knowledge necessary for comprehension. Teachers, using a variety of instructional methods, can help enhance students' knowledge of text content, text structure, and text-processing strategies and, as a result, enhance their students' ability to comprehend text. We will focus specifically on questioning techniques and strategies as they appear to be particularly effective in promoting active reader/text interactions (Anderson & Biddle, 1975; Rothkopf, 1982).

What Questioning Strategies Have Been Effective in Developing Students' Comprehension of Expository Text?

Questioning practices and strategies can increase students' conceptual knowledge, develop knowledge of text structures, and enhance use of text-processing strategies. In examining the role of questions, we will use the reading lesson as a framework for the discussion. Most lessons involve preparing students for the content to be read, directing students to read a specific portion of the text, then discussing with the students what they have read. In describing this framework, Mason and Au (1986) identify the three phases as prereading, guided reading, and postreading. In the following sections, we present, compare, and discuss a selection of effective questioning practices for use during the three phases of instruction. These techniques include both teacher-initiated questions and student-generated

questions. Representative research upon which these methods are based is cited throughout each of these sections.

Prereading Questioning Strategies

Studies have clearly shown that information from text must be connected to what is already known in order to be comprehended (Bransford & Johnson, 1972). Learning new information requires already having some related information. This does not mean that students must know the content before it is taught. Langer (1982) states, "It is this writer's contention that almost everyone knows something (however remote) about almost everything" (p 150). Accessing that knowledge (however remote) is the objective of prereading activities.

There is reason to believe that, as important as this phase is to comprehension of text, there is often little attention to or time allotted for such preparation. First, examination of teachers' use of basal texts (Durkin, 1984) indicates that this activity is often omitted during reading instruction. Given the other parallels between developmental reading instruction and content reading instruction in terms of the amount of instruction and quality of guidance in teachers' manuals (Armbruster & Gudbrandsen, 1986; Neilsen, Rennie, & Connell, 1982), it is likely that such activities are also infrequent during content area instruction. Second, teachers' guides for content area textbooks offer few specific guidelines for introducing students to the content to be read. The importance of adequate prereading activity has been underscored by the findings of research in students' "preconceptions" (Anderson & Smith, 1984; Lipson, 1982; Maria & MacGinitie, 1983). Not only do students comprehend more if appropriate background knowledge is accessed, but they often will misinterpret or ignore textual information because of inaccurate information in their own

background knowledge, leading to comprehension failures of which they are not aware.

Thus, activities related to building background knowledge serve several purposes, including (a) developing background knowledge when students have none available, (b) helping students access appropriate background knowledge they already have but may not recognize as relevant, and (c) exposing background knowledge that is inaccurate and incompatible with the text. In developing appropriate prereading questions, several compatible methods have been examined in different instructional research programs, including PReP (Langer, 1982), C-T-A (Wong & Au, 1985), Inference Training (Hansen & Hubbard, 1984), Previewing (Graves, Prenn, & Cooke, 1985), and K-W-L (Ogle, 1986). These methods share the fundamental assumption that, through appropriate questioning by the teacher or self-questioning by the student, relevant background knowledge can be made available. Initially, it is critical that teachers model for their students the types of questions that are both appropriate and useful to ask.

Pre-Reading Plan (PReP). Langer's Pre-Reading Plan (Langer, 1982, 1984) is one example of how teachers can model useful prereading questioning activities. In PReP, questions are used to prompt students to activate background knowledge relevant to a central concept from a text to be read. PReP has three phases designed to bring students' background knowledge to a conscious level in preparation for reading. The first phase, Initial Associations with the Concept, requires that teachers review the section of text to be read by the students, decide on a key concept, and select a word, phrase, or picture that can be presented to the group to start a discussion on the topic. For example, when introducing a text on the effects of the Industrial Revolution, the discussion could begin with an implied question by the teacher such as, "What do you think of when you hear the word

'industry'"? During this phase the goal is to have students brainstorm as many free associations with the chosen concept as possible.

During the second phase, Reflections on Initial Associations, students are asked to explain their free associations. Teachers ask questions such as, "Where did that idea come from? and "Why does industry make you think of machines?" Langer considers the social aspect of PReP an important one. By listening to the associations and explanations of others, students are extending their background knowledge. This sharing may also help to correct accessing of inappropriate background knowledge (e.g., responding with "dust") and provide students with an opportunity to correct misconceptions. Finally, this phase provides the basis for students' understanding of how text and background knowledge interrelate.

In the final phase of PReP, Reformulation of Knowledge, students again make free associations with the original concept, prompted by the question, "Do you have any new ideas about industry?" Often, student responses in this third phase reflect a higher level of understanding than responses in the first phase; that is, the use of superordinate concepts, analogies, and characteristics versus remotely related, firsthand experiences or phonetic word associations. Langer notes that the phases of PReP can provide diagnostic information for the teacher, as well as enhance students' comprehension. In examining students' responses, the teacher can determine if the level of prior knowledge that students demonstrate is sufficient for their understanding of the reading selection to come.

PReP provides teachers with an opportunity to model prereading questioning strategies. Through these questions (i.e., "What do you know about . . . ?" "How do you know that?" and "Do you have any new ideas about . . . ?") and group discussions the teacher is demonstrating for students the need to consider information they already have, collaborate with peers to enhance their knowledge base, and reflect on new information.

For students to become fully aware of the value of such activities, and to recognize the points for invoking them, a component beyond modeling is critical. Studies by Roehler and Duffy (1984), focusing on teacher explanations of reading comprehension processes, suggest that giving students reasons for why a particular strategy is being used (i.e., how the strategy can help a reader understand the text) is the kind of information that lays the foundation for students' eventual independent question asking. Thus, an additional important component is for teachers to discuss with students why they are asking these questions prior to reading, what activities are useful, and how students can and should carry out such activities when they read independently.

Concept-Text-Application (C-T-A). Another technique that helps teachers model prereading question asking for students is Concept-Text-Application (Wong & Au, 1985). Like PReP, C-T-A uses guided discussion to enhance background knowledge before reading. Although designed for use with elementary students, this technique can easily be adapted for older students in content area classes. During the Concept phase, or C-phase, the goal is to find out what the students already know and determine what they need to know.

The teacher previews the reading and selects a main idea or key concept for the prereading discussion. For example, the teacher in Wong and Au's (1985) study was presenting a lesson on the Loch Ness monster. The focus of the text to be read was on the evidence presented to support the existence of the monster. To elicit student knowledge about the general topic of the passage, the teacher asked students, "Are monsters real?" In the discussion that followed, she introduced the concepts "fact" and "opinion" and then reminded the students to look for evidence indicating whether the monster is real as they read the text. Although not included in the study, it also is important for teachers to explain to students why the activity of setting

purposes for reading is helpful if students are to begin to do such self-questioning spontaneously in their future reading. This prereading phase is followed by the students' reading of the text and a group discussion (Text-Application). Both of these phases will be discussed later in the chapter.

Inference Training and Previewing. Inference Training (Hansen & Hubbard, 1984) is a third method designed to activate background knowledge. The technique is described to students as comparing "your own life" to situations in a text. After reviewing the selection, the teacher identifies several key ideas and generates two questions for each. The first question asks students to think of a personal experience related to one of the key ideas. The second question gives the students some specific information about the situation in the text and asks them to hypothesize what might happen. As in the other methods, ideas are shared in a group discussion and students are therefore exposed to a variety of experiences that help to extend their background knowledge for interacting with the text.

To illustrate, given a selection on conservation of natural resources, a teacher may decide that the key idea is that there are some natural resources that cannot be renewed because there is a finite supply available to be used. A question designed to relate to students' personal knowledge might tap into situations in which they feel they have experienced scarcity. For example, both high school and middle school students may have experienced a scarcity in their allowance or job-related income or they may have run out of supplies when building a clubhouse. The follow-up question might ask students to hypothesize, given their background knowledge about scarcity, about the content of the text to be read and the issues surrounding scarce resources such as gas and oil or energy in general.

Graves, Prenn and Cooke (1985) use some of the techniques of Inference Training in their program called Previewing. This program has been used successfully with middle school students reading social studies texts

(Graves & Prenn, 1984). Similar to a movie theatre's showing of coming attractions, the reading preview is intended to arouse students' interest in the selection to be read. The preview is also used to build background knowledge, establish an organizational framework, and provide specific knowledge about the topic. This technique differs from Inference Training in that the preview is a fairly lengthy script written by the teacher and read to the students.

A preview for a science selection on forest succession would begin, like Inference Training, with personal experience questions which highlight the text's main ideas; for example, think about the last time you were in the woods. Can you describe what you saw there? What did the ground, the trees, the birds look like? Do you think it always looked this way? These questions would be followed by a synopsis of the selection that gives students specific information about the key concepts. For the example above, the synopsis would point out the chronological nature of the topic and would identify important concepts, such as pioneer trees, middle stage, and so on. Finally, the preview contains a question or statement about what to look for in the reading. Since the Previewing procedure is more time-consuming and more teacher-directed than Inference Training, it may be most efficient to use it when a particular text's organization is unclear and/or requires specific knowledge about unfamiliar concepts.

What I Know-What I Want To Learn-What I Learned (K-W-L). A questioning strategy that logically extends the approaches described above is Ogle's K-W-L (Ogle, 1986). Her work extends the previous methods with its focus on transferring the control of the prereading question asking from the teacher to the students themselves. The K-W-L method moves beyond teacher modeling by having students take responsibility for the questioning prior, during, and after reading. A question guide is used to provide support for

appropriate questioning at different phases during the reading task. The guide is designed to encourage students to ask themselves useful questions when faced with the task of learning from text. The guide sheet is divided into three sections: K--What we know (which also includes a subheading, Categories of information we expect to use), W--What we want to learn, and L--What we learned and still need to learn.

Similar to the other approaches in its focus on question developing and accessing background knowledge, Ogle proposes a prereading activity that consists of a discussion between teacher and students. The discussion begins with the teacher identifying a key concept from the selection to be read and asking students what they know about that topic. Ogle recommends beginning with the most specific topic about which students may reasonably be expected to have some information. Thus, in Step K the goal is to draw out information that will be helpful in reading while avoiding irrelevant information. However, if the teacher finds that students' background information is very limited, it may be necessary to move toward more general categories until students are able to offer ideas.

For example, in preparing students for a selection on black widow spiders, it may be more appropriate for students to answer the question "What do I know about spiders [in general]?" rather than the question "What do I know about black widow spiders?" Students answer the question by brainstorming whatever comes to mind concerning the topic. The teacher records these ideas on a board, large paper, or on an overhead transparency. After group sharing of ideas, students record their chosen responses on the worksheet.

A follow-up question students learn to ask during this accessing of background knowledge phase is, "How do you know that?" Note the similarity between this and Langer's second phase question, "Why does [the word] make

you think of [student response]?" This question helps reveal misconceptions and doubts about what one knows.

A final question modeled by the teacher in Step K, "Are there any categories of ideas in this list?" is followed by a discussion of ways to organize the student responses that have been generated. This categorization of ideas may be difficult even for middle school students at first and will require that the teacher start off the activity by selecting several ideas and showing how they can be joined together under one superordinate category. The focus is to have the students suggest what categories of information might be included in the text.

In Step W the teacher highlights the disagreements and gaps in information that resulted from Step K and asks, "What do you want to learn?" The students discuss this and then each individual student formulates the questions he or she is interested in answering while reading and writes these in the "What I want to learn" section of the worksheet.

Choosing prereading activities. In choosing an appropriate approach for accessing students' prior knowledge, teachers use information about the text and their students. A certain text may invite a particular prereading method. For example, if students have direct personal experience with the subject of the text, the Inference Training approach may generate the most prereading discussion. To introduce a selection on the role of antibodies in fighting infections, appropriate questions might focus on students' experiences with vaccinations (e.g., When did you get a vaccination? What was it for? How was it done? Why do you think you got it?). Another way to use Inference Training is through analogous and/or vicarious experience. For example, to prepare students to read an introduction to supply and demand principles in economics, a teacher could ask students about collecting things and focus on the idea that, when something is wanted by people and there isn't much of it, it becomes more valuable (e.g., Who has ever

collected something like coins, baseball cards, or stamps, or knows someone else who has? What other things do people collect? How do you add to your collection?).

If students are likely to have actual content knowledge or firsthand experience of the subject matter to be read, C-T-A and K-W-L will both elicit that knowledge and help students organize it. If, on the other hand, it is likely that students have very little content knowledge or firsthand experience, PReP, by using free association brainstorming techniques, will help develop background knowledge and will also provide diagnostic information about the students' level of knowledge.

In summary, we know that what readers bring to a text determines to a large degree what they comprehend from that text. Thus, prereading questions are intended to activate, review, and develop background knowledge; preview key concepts; and set purposes for the reading to follow. Teachers' questioning strategies are the result of their advance reading of the material and their identification of the key concepts and principles presented in the text. Further, when teachers ask prereading questions they serve an important role in modeling for students appropriate activities for their eventual independent question asking prior to reading.

During-Reading Instruction

Whereas prereading questions are designed to build or activate background knowledge, question asking during reading serves an important role in what is referred to as comprehension monitoring. Readers who formulate questions while reading anticipate what is to come in the text and look for information that can confirm or disconfirm their predictions. Because these readers have questions, they can more easily check if the message they are constructing makes sense and if the ideas are interrelated. Good comprehenders, therefore, know what ideas to attend to, how to group these ideas

together, and when a comprehension failure has occurred. Passive readers, in contrast, read line by line and do not spontaneously connect ideas and determine their relationships. The task is similar to memorizing a list of unrelated details (Taylor & Samuels, 1983). During-reading activities, therefore, should help students become aware of their comprehension failures and prompt the use of appropriate strategies to guide and improve comprehension. According to Niles (1985), during-reading questions should (a) check the meaning that students create from the text (content questions) and (b) focus on the strategies used to arrive at such meaning (process questions).

Content questions. One example of guided discussion or during-reading questioning that extends a prereading strategy and models the asking of content questions is found in the Text-Application phases of Wong and Au's C-T-A (1985). Following the prereading discussion, students read a short section of text silently and then are asked questions related to the purpose for reading that has been established in the Concept phase, or C-phase. This is followed by discussion of other information in the text. Preparation for the Text phase, or T-phase, requires the teacher to develop "cueing" questions that focus the children's attention on the text's major points.

Continued guided discussion about the concepts in the text uncovers failures in comprehension. With this activity the teacher can determine if the students had difficulty integrating the new information in the text with the background knowledge activated during prereading. For example, Wong and Au (1985) cite a text about the Loch Ness monster that describes an echo sounder, a concept that did not arise in the prereading activity focusing on whether or not monsters were real. The teacher, modeling for students appropriate question asking, asked a series of content questions (e.g., "How

does the echo sounder work?" and "What do the sounds tell you?"). The students' answers to these questions (e.g., "It picks up sound," and "It tells you where there are lots of fish") indicated that they did not understand the concept of echo sounder. Using questioning, the teacher was able to make students aware of the comprehension failure and the need to take action to restore understanding; in this case, information from outside the text was required.

Process questions. In addition to focusing on content, during-reading instruction should also focus students' attention on the process. Niles (1985) suggests that to develop independent, strategic readers, it is necessary to make the process visible, through the teachers' asking of questions about the reading process. She describes the role of "intervening questions," suggesting that teachers have students read a short section of text silently, then have a discussion focused on teacher questions that integrate both the reading process and the content of the text. For example, assume as a teacher you have asked students to silently read a section in a social studies text about the pioneers' westward movement and the dangers of crossing the Mississippi River. A content question guides students to identify information from their text (e.g., what were two dangers the pioneers faced in crossing the river?).

Process questions focus on strategies used in their reading and question answering. Thus a process question for this selection is, "How does thinking about your experiences going across the Red Cedar River help you understand the pioneers' problems?" Another process question might focus their attention on the clarity of the text: "Are there any words that do not make sense or are confusing to you?"

According to Niles, process questions focus on a variety of elements, including making predictions; confirming or disconfirming those predictions; or noting characteristics of the text that cue important ideas such

as paragraphing, underlining, or use of italics. In short, these are the types of questions readers ask when monitoring their comprehension. Niles stresses the importance of focusing on both process and content but does not provide specific guidelines for teachers to develop these questions. One possible guide for developing such questions is knowledge of the organization of ideas in a text or the text structure. This knowledge can provide the teacher with information for deciding both when and what to ask students.

For example, assume students read a selection that described problems some plants in swampy areas have making food. The plants solve the problem by eating flies. The structure of this text is problem/solution. A content question would refer to the type of problem (getting food) and its solution (eating flies). A process question could ask students about the problem/solution text structure and how it helps readers to identify important information.

Organization guides. A number of researchers have examined the structures or patterns of texts and many names have been used to describe these: story maps, story grammars, idea maps, pattern or organization guides, and so forth. The essential feature of these is that they reveal the predictable relationships of ideas for a given text. In looking at narrative text, Beck and McKeown (1981) refer to the value of creating a story map. Narratives in content areas often occur when students read biographies of famous persons or chronicles of major historical events, such as the pioneers' westward movement. To develop a story map the teacher determines the setting for the narrative, the major events that make up the plot (implicit as well as explicit ideas), and the characters' reactions to the events. Questions can then be developed that bring out both the information and the organization of the story map (Beck & McKeown, 1981; Gordon & Braun, 1983).

Instructing students about story grammars has helped students become aware of questions to ask as they read stories (Gordon & Braun, 1983; Short & Ryan, 1984; Singer & Donlan, 1982). First, students learn the elements of a narrative (e.g., setting, goal, event, reaction); then, schema-general questions for each element (e.g., What is the setting? What does the main character want to do?); then they receive training in generating story-specific questions using the general questions as a guide (e.g., How did the pioneers cross these rivers?). This direct development of self-questioning helps put the reader in control of comprehension monitoring. Using a story grammar guide cues the reader's attention to the important ideas and guides the readers' predictions while reading.

The narrative structure is the most familiar to middle school students because it is the organization used for a large majority of the reading selections in basal readers. As mentioned earlier, content area texts represent a challenge in that the selections use unfamiliar structures. To compound the problem, many content area texts tend to be "inconsiderate," that is, not well structured (Armbruster, 1984). Therefore, text structure instruction can serve two functions: (a) helping students comprehend material which is organized in a different way from their reading instruction selections, and (b) giving them a guide for organizing poorly structured texts.

Raphael and Kirschner (1985) instructed middle school students in comprehending social studies material written in a compare/contrast text structure. They provided students with a list of four questions specific to this particular text structure: (a) What is being compared or contrasted? (b) On what are they being compared or contrasted? (c) How are they alike? and (d) How are they different? Initially students were presented with brief, clearly written paragraphs of comparison and contrast found in social studies texts (e.g., colonists' and native Americans' view of land; early

and late immigrants). Students used the guiding questions to identify important information and supporting details and also were taught how to use key words and phrases to locate relevant information.

This instructional program was extended by Raphael, Kirschner, and Englert (1986) to aid in both composing and comprehending the additional text structures of problem/solution and explanation. The results of this study and other studies (e.g., Flood, Lapp, & Farnan, 1986; McGee & Richgels, 1985) suggested that having students become authors of expository text themselves was one vehicle for internalizing the question guides. Students who were writers themselves learned the importance of text structure questions and the key words and phrases used to signal to readers the organization of their text. Question guides like that used by Raphael and her colleagues (Raphael & Kirschner, 1985; Raphael et al., 1986) serve the same purposes as the story grammar with narrative text. Teachers can use information about text structures for developing both content and process questions, and students can use text structure knowledge to make predictions and monitor their comprehension of expository text.

Reciprocal Teaching. An example of how teachers can model the application of the above concepts to reading expository or content area text is found in Palincsar and Brown's (1986) Reciprocal Teaching procedure. This method is a good example of a technique that is actually a synthesis of several individual strategies. Palincsar and Brown used reciprocal questioning training to teach students to ask both process and content questions after reading segments of informational text. This instruction took place gradually over several weeks, focusing on four components: (a) summarizing in a simple sentence the paragraph or selection read, (b) generating a question related to the selection read to ask a peer, (c) demanding clarity or asking for resolution of anything from the selection that was not clear

or did not make sense, and (d) predicting or generating a question for the next section to be read. Initially teachers modeled each component for the students, then gradually teacher and students shared responsibility or took turns generating each component until finally the students assumed complete control. With this instruction in summarizing important points, predicting test questions, generating clarification questions, and predicting what will come next, students learned a concrete useful approach to gaining information from text independently.

In summary, during-reading questioning, whether teacher- or student-generated, should promote student understanding of content as well as the processes of reading that lead to understanding. Questioning activities that help students "see" a text's organization and use that organization to select important ideas, group ideas together, and anticipate information based on what questions should be answered, can promote these text-processing and comprehension-monitoring goals. For all the aforementioned during-reading activities teachers need to preview material to determine the author's organization or the text's main ideas. Vacca (1981) notes the importance of keeping the instruction simple, because complicated analyses of text are not necessary for classroom teaching. Initially, students will need to be told what a particular text's structure is and reminded of the questions it answers. As Niles (1985) suggests, the need for extensive during-reading interactions will decrease as students internalize the questioning strategies. Such interventions can be reserved for texts that may be particularly problematic for a given group of students because they are unfamiliar with the topic and/or the structure is complex.

After-Reading Questioning

In content area reading, it is important for students to remember, in addition to comprehend, what they have read. After-reading activities

should provide students with additional opportunities to practice or rehearse what has been learned from the text, as well as to increase the associations that can be made between the textual information and their own background knowledge.

Postreading questioning is perhaps the most familiar component of reading instruction, often, and unfortunately, because of the current emphasis on assessment (Durkin, 1981). While prereading or during-reading questions are not traditionally found in content area texts, after-reading questions are quite common. There has been extensive research in this area (e.g., see Hanmaker, 1986) with a new interest in the role of postreading questioning in enhancing students' comprehension of text, not merely assessing it. This means that, again, there is a need for focusing on process as well as content. Many of the questioning procedures discussed already have guides for teachers for developing postreading activities. Thinking about the purposes for after-reading questioning is helpful for teachers (a) to design questions when they are not available (e.g., when using informational material other than the textbook) and (b) to determine the appropriateness of the questions included in the text.

Reviewing information. One purpose of postreading questioning related to increasing comprehension of expository text is to ask students to review the information by summarizing. There are several ways to accomplish this. One way is to have students review the text in terms of the question that was posed during the prereading discussion. In Wong and Au's (1985) C-T-A procedure, teachers repeat the main idea question in the Application phase. Students summarize all the information about this question that has been discussed with each section of text. In Ogle's (1986) K-W-L technique, students write down what they learned from their reading either while they are reading or immediately after reading. This information is then compared with the questions that were generated and written down by students in the

"What I want to learn" phase. A discussion follows in which students summarize what questions were answered and what questions remain unanswered. In this way attention is focused on reading to answer student-generated questions.

Another way to assist students with the summarization task makes use of the text's structure. The same questions that help students monitor their comprehension while reading can be used to guide summarization of the content. For example, Taylor and Beach (1984) had students summarize expository text using a hierarchical ordering of main ideas and details. Raphael and Kirschner (1985) found that using the comparison/contrast text structure question guide aided students in selecting and organizing relevant information when summarizing across two passages. Note that during the reviewing information phase, both content and process questions should be asked. In this way students review both the subject matter of what they have read, and they are directed to attend to how they decided on the information to include in their review.

Applying information. Another purpose of postreading questioning is to help students integrate the information into their personal experience. Hansen and Hubbard (1984) recommend that teachers model the asking of inferential rather than literal questions so that students will interpret text in terms of their background knowledge; that is, teachers should ask questions not explicitly answered in the text. There is research evidence that textually implicit questions promote reader/text interactions that facilitate comprehension and learning from text (Wixson, 1983). As in the summarization task, the idea is to avoid memorizing facts unconnected to what is already known.

Finally, there are extension activities whose primary purpose is to transfer the control of the processes modeled to encourage students to use

what they have learned independently. One activity suggested by Wong and Au (1985) is to have students write a "parallel report." When writing a parallel report, students use the previously read selection as a guide, answering the same questions for a related but different topic; for example, Wong and Au mention writing about Big Foot, or the Cyclops, after reading about the Loch Ness monster. Similarly, Ogle (1986) suggests that students can extend their understanding of the topic by finding other materials that might answer those student questions not answered by the author of the text just read. These activities foster student independence in strategic reading to learn and remember new information.

What Instructional Methods Contribute to Students' Independent Use of Questioning Strategies?

In this paper we have examined the types of knowledge students need to comprehend expository text. We also have demonstrated the potential utility of using questioning strategies before, during, and after reading text in order to develop students' knowledge about text content, text structure, and text-processing strategies. Now we focus on the third question of interest to content area teachers: What instructional methods facilitate students' use of questioning strategies while reading expository text independently? How can questioning techniques best be presented by teachers and used by students to encourage self-questioning in our middle school and high school readers? Research in classrooms confirms that the most effective way to bring about student control of strategy is through an instructional sequence in which independent use is preceded by direct explanation and guided practice (Brown, Campione, & Day, 1981; Corno, 1986; Gordon, 1985; Pearson, 1984, 1985; Rosenshine & Stevens, 1986).

Direct Explanation and Modeling

In this first phase of the instructional sequence the teacher has the responsibility for using the questioning strategy under study. First, the teacher provides students with a direct explanation of the strategy including (a) a definition of what the strategy is, (b) a reason why they are learning the strategy (i.e., how it will help them in their content area reading), (c) the steps in how to use the strategy, (d) the appropriate times when the skill is useful, and (e) ways to decide how well they used the strategy and its effectiveness in enhancing their comprehension (Roehler & Duffy, 1984; Winograd & Hare, in press). A sample of such explanation and modeling can be seen in the dialogues for introducing Question Answer Relationships (pp. 30-32).

The second component of this phase of instruction is teacher modeling. Having given students a direct explanation, the teacher then performs the task while thinking aloud thereby making the mental processes visible to the students. For example, when modeling how to use the inferencing strategy, Gordon (1985) suggests that the teacher read the text, ask the inferential question, and then explain his or her thinking while answering the question. This explanation might include asking and answering the following questions: "What do I know in my head about this question--from my personal experiences and things I've read before or have seen on television?" "What does the text tell me about this question?" and "What ideas do I get when I put together what's in my head and what's in the text?"

If a strategy cannot be used by students as it was modeled by the teacher, then it is necessary to provide additional explanation in how to use the strategy. For example, in prereading activities, teachers read the selection before developing the guiding questions that activate background knowledge. Therefore, in order for students to take on the responsibility

of asking prereading questions, teachers need to explain and model strategies that substitute for advance reading. These could include skimming for key words, noting headings, reading beginning and ending paragraphs, and examining pictures and graphic aids.

Guided Practice

During direct explanation, the teacher performs all the steps in using the strategy. When conducting a guided practice, in contrast, the teacher asks the students to take responsibility for more and more of the steps until they are in control of the entire procedure. During this time teachers provide students with some type of support or instructional scaffolding (Applebee & Langer, 1983). The metaphor of a scaffold is used to illustrate the idea that the support provided by the teacher during guided practice is temporary and adjustable. This scaffolding (e.g., a list of questions on the board, an acronym such as K-W-L, a question guide sheet for text structure, etc.) helps students follow the steps in the strategy even though they could not perform the task independently .

Guided practice also provides opportunities for students to receive corrective feedback to improve their use of a strategy. Palincsar and Brown's (1986) Reciprocal Teaching is a vivid example of instructional scaffolding as the students prepare to take over the role of teacher. Guided by the four types of questions to ask and answer (What is the main idea of this text? What is a question that is answered by this text? What needs to be clarified? and What might happen next?), the students are gradually able to lead the group discussion as the teacher provides less and less support and feedback.

Therefore, students' independent use of a strategy is the result of sufficient guided practice. Once control of the strategy has shifted from teacher to student it becomes important for teachers to monitor students'

performance. Any scaffolding which has been provided can be adjusted or removed (and then replaced) according to students' needs.

Transferring Control to the Learner: Question Answer Relationships (QARs)

One illustration of a strategy designed to bridge the gap from teacher to student control of the questioning process is Question Answer Relationships (Raphael, 1982, 1986). QAR is a program designed to demystify the questioning process, providing teachers and students with a common vocabulary to discuss different types of questions and sources of information for answering these questions, both of which are fundamental to students' eventual generation of questions. Four QARs have been proposed based on the Pearson and Johnson (1978) taxonomy of questions distinguishing between questions that invite answer information right from the text and questions most appropriately answered with information from the reader's knowledge base.

Text-based QARs are classified as Right There (i.e., words used to make up the question and words used to answer the question are "right there" in the same sentence of the text) and Think and Search (i.e., information to answer the question is in the text, but one must "think" about how the information relates and "search" across the text for relevant information). Knowledge-based QARs are classified as Author and You (i.e., information to answer the question is not available in the text, but you must have read the text to understand what the question is asking) and On My Own (i.e., the answer can be provided from the reader's own background knowledge, without even reading the text). Teaching students about QARs is most beneficial after students have had modeled for them appropriate prereading questions, guided reading questions, and postreading discussion questions (e.g., using C-T-A, Inference Training, and others discussed in the previous sections).

After modeling, a period of explicit instruction in the elements of QAR is important. These elements include (a) the text being read and questioned, (b) the questions generated to promote comprehension, (c) the answer(s) to the questions, (d) the question answer relationship, and (e) the justification or explanation for selecting a given QAR. Initially the teacher provides all five elements, asking students to read the text, asking the question, providing an appropriate answer, identifying the QAR, and explaining why. Such modeling may proceed as follows:

> T: (following an assigned reading of a text on the pioneer movement from the Mississippi across the Great Plains). You have just completed reading about some pioneers and will be answering some questions about the text. One useful strategy is to think about different sources for finding the answer information. Let's look at some examples together. The first question asks, What are some of the provisions the early settlers brought with them on their journey? Look back in your book to pages 85, 87, and 88. Notice on each page, there is a description of different kinds of provisions. When we put all this information together, we can answer the question. The answer is clothing and personal goods, equipment for beginning to farm, building supplies, and medical equipment. We had to "think and search" across the text, thus this is a Think and Search QAR.

Notice that the teacher provided all of the information, with little input from the students. As transfer of control occurs, there is a shared responsibility between teachers and learners (Gordon, 1985), in which the teacher leads the learner to select and implement appropriate strategies. With QAR instruction a second step is for the teacher to provide text, question, answer, and QAR but have the students explain why the question and answer represent a given QAR. If students appear to understand the reasons underlying a selection of a QAR, the next step is for the teacher to provide the QAR and the reason why. Third, teachers may progress to providing only the text and question, with students' providing the answer, QAR, and reason why, as follows:

T: You have just finished reading the selection on pioneer movement west from Mississippi and are to answer some comprehension questions about what you've read. This is a good opportunity to use your knowledge of QARs to help you. Let's look at the first question, What are some of the provisions the early settlers brought with them on their journey? What do you think the answer could be?

S: Medical supplies

T: Where did you find that information?

S: On page 87 it discusses the lack of medicines available once they left the cities.

T: Good, what else?

S2: Clothing, because they couldn't buy cloth and things out west, and also farm equipment to set up plowing and stuff because they needed to get food started right away.

T: Good! And how did you know that?

S2: It was on page 85 and also a little at the end of the chapter.

T: Who can summarize the information so far?

S3: They brought clothing, farm equipment, medicine.

T: What kind of QAR does this represent?

S4: A Think and Search

T: Why?

S4: The answer is in more than one place.

S3: Even part of the answer was in more than one place, but it was all in the text somewhere.

Notice the increased dialogue as students share in the responsibility of strategy selection and location of answer information, while the teacher maintains control of the selection of text and the questions asked. Eventually, the teacher may wish to have students not only answer questions, but generate them as well, such as in a Reciprocal Teaching activity (Palincsar & Brown, 1986). At the extreme, students could generate their own text in writing expository reports related to the content area reading, providing

questions to their readers, and thus demonstrate total control over the elements in QAR instruction.

Moving through a procedure such as the one described provides students with the understanding of what QAR is and how QAR can be used to locate information. A further step to transfer control completely is to help students understand when and why they should draw upon their knowledge of QAR.

The following dialogue provides an example of initial attention to the "when" and "why":

T: You are all becoming very skilled at knowing the four QARs and how they can be used to locate information. Does anyone have any idea about when to use QARs?

S1: Well, if we're asking each other questions and you say you want us to ask better questions, we can ask whether you mean Think and Search or Author and You.

T: That's certainly one time to use what you know about QARs. Can anyone think of a time you could use QARs when I'm not around?

S2: Maybe if we've been answering questions after a chapter and can't find the answer we could try to use Author and You or On My Own.

S3: Or maybe we could ask a friend what kind of QAR it is if we're stuck.

T: Great! You've thought of good examples of when and why QARs are useful. Sometimes, when we are asking each other questions or answering questions in our social studies or science books or even if we get stuck and ask a friend for help, knowing about QARs comes in handy.

The teacher would eventually help students to determine how well the strategy worked by checking if their answers make sense or checking their answer with their peers.

Conclusion

The quantity of research that has focused on questions underscores how pervasive questioning activities are in today's classrooms. Yet, pervasiveness alone does not promise that questions are effective tools to aid

comprehension of text. It is our hope that the information provided in this paper extends understanding of the important role that questions play during comprehension instruction, provides some specific guidelines for teachers in their questioning practices, and suggests strategies for using questioning as a vehicle for enhancing students' independence by becoming thoughtful and strategic readers.

Summary

Many upper elementary and high school students do not possess the necessary skills for independent reading of their content area textbooks--they must be taught. Rather than separate the process of reading from the content to be read, content area teachers can provide instruction in reading within content area teaching which will enhance students' comprehension (Moore & Readence, 1986; Niles, 1985). One facet to such instruction is the use of questioning techniques before, during, and after student reading.

The purposes of prereading questions are (a) to activate, review, and develop background knowledge; (b) to preview key concepts; and (c) to set purposes for the reading to follow. During-reading questions promote students' monitoring of their comprehension. Questioning activities that make use of a text's structure can help students (a) select important ideas, (b) group ideas together, and (c) anticipate the information that is to follow. Postreading questioning provides students with opportunities to review and remember what they have read. Such questioning activities lead students to (a) summarize what has been read and (b) apply the information in extended activities such as writing reports, evaluating science experiments, and so forth.

Instruction using questioning should lead to the transfer of control of comprehension questioning strategies from teacher to student through direct

explanation and modeling, guided practice with corrective feedback, and monitoring of students' independent practice. The ultimate goal of all instruction in comprehension strategies is helping students internalize the strategies that can enhance comprehension during independent reading.

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